SURREBUTTAL TESTIMONY

OF

BRIAN HORII

ON BEHALF OF THE

SOUTH CAROLINA OFFICE OF REGULATORY STAFF

DOCKET NO. 2019-2-E

IN RE: ANNUAL REVIEW OF BASE RATES FOR FUEL COSTS FOR SOUTH CAROLINA ELECTRIC & GAS COMPANY

Q. PLEASE STATE YOUR NAME, BUSINESS ADDRESS AND OCCUPATION.

A. My name is Brian Horii. My business address is 44 Montgomery Street, San Francisco, California 94104. I am a Senior Partner with Energy and Environmental Economics, Inc. ("E3") and have been retained by the South Carolina Office of Regulatory Staff ("ORS").

Q. DID YOU FILE DIRECT TESTIMONY AND AN EXHIBIT RELATED TO THIS PROCEEDING?

A. Yes. I filed direct testimony and an exhibit with the Public Service Commission of South Carolina ("Commission") on March 19, 2019.

Q. WHAT IS THE PURPOSE OF YOUR SURREBUTTAL TESTIMONY?

A. My surrebuttal testimony addresses the rebuttal testimony of South Carolina Electric and Gas Company's ("SCE&G" or "Company") witnesses Joseph M. Lynch, Matthew W. Tanner, and Eric H. Bell regarding SCE&G's estimated value of solar capacity and variable integration costs ("VIC").

SURREBUTTAL TO REBUTTAL TESTIMONY OF JOSEPH M. LYNCH

Q. DO YOU AGREE WITH SCE&G'S CLAIM THAT YOUR TESTIMONY REGARDING THE CAPACITY VALUE OF SOLAR "IS LARGELY IRELEVANT BECAUSE IT DOES NOT IDENTIFY ANY EFFECT ON SCE&G'S RESOURCE PLAN AND DOES NOT EXPLAIN HOW THE COMPANY AVOIDS ANY CAPACITY RELATED COSTS" (LYNCH REBUTTAL, P. 2)?

A. No. My testimony is certainly relevant because the correct recognition of the contribution of solar to resource capacity would directly impact SCE&G's future resource needs. In order to translate my findings to actual capacity cost savings, SCE&G should update their estimation of capacity contributions from solar generation by using my capacity value factor of 4% for solar, rather than simply assume 0%. This is common practice in the electric industry in determining the need for system capacity resources. In various industry publications, the capacity value of solar is commonly referred to as the Effective Load Carrying Capability of the resource.[1] Once recognized correctly in the Company's resource plans, costs would be avoided via reduced capacity purchases or deferred or resized plant construction.

Q. DO YOU AGREE WITH SCE&G'S ASSERTION THAT THE LOSS OF LOAD EXPECTATION ("LOLE") METHOD IS FLAWED AND THEIR SUBSEQUENT REASONING AS TO WHY (LYNCH REBUTTAL, PP. 2-5)?

[1] NREL, *Using wind and solar to reliably meet electricity demand*, **https://www.nrel.gov/docs/fy15osti/63038.pdf**
CPUC, *Effective load carrying capability and qualifying capacity calculation methodology for wind and solar resources*, **http://www.cpuc.ca.gov/WorkArea/DownloadAsset.aspx?id=6555**

A. No. I utilize LOLE-based capacity values from Duke Energy Carolinas, LLC ("DEC") and Duke Energy Progress, LLC ("DEP") to infer the solar capacity value for SCE&G. It is therefore important for the Commission to be aware that the LOLE method is an industry standard method for evaluating system capacity. Witness Lynch attempts to undermine the LOLE methodology via his presentation of his "spike in load" example. This surrebuttal response addresses those points.

In defending his dissatisfaction with LOLE methodology, witness Lynch claims that "spikes in other hours of the year, loss of generating capacity and importing power, all of which represent considerations beyond the calculation of the LOLE index" (Lynch Rebuttal, p. 3). This assertion is not compelling and fails to recognize that the probability of load increases (spikes) as well as load decreases are fundamental to the LOLE calculation, as are the probabilities of generation outages. Moreover, witness Lynch misses my point that imported power is a valid way for utilities to address demand spikes that occur during actual operations.

Witness Lynch further claims that while it would not be appropriate to build a 500 MW generating plant to address the risk of a 500 MW spike in demand, it would be appropriate to deploy a demand response program for the full 500 MW (Lynch Rebuttal, pp. 3-4). Witness Lynch appears to stand firm in his belief that you need an additional 500 MW of resources to address the chance of a 500 MW spike, even if he disputes the type of resource to add. Again, this shows a reluctance to accept the balancing of risk as accepted by the electric industry through the use of an LOLE method.

Witness Lynch then goes on to discuss the demand risk he calculates in his reserve margin study, but that is not relevant to the issue of whether the LOLE method correctly addresses spikes in demand.

Q. SCE&G CLAIMS THAT THEIR APPROACH TO PLANNING IS NOT "DETERMINISTIC" (LYNCH REBUTTAL, P. 4). DOES THAT IMPLY THAT THEIR ZERO VALUATION OF SOLAR CAPACITY SHOULD BE ACCEPTED?

A. No. Even though part of the SCE&G planning process uses a deterministically determined value, they still apply that to a single annual peak. The use of the single annual peak does not allow for the proper determination of the capacity value provided by solar in the other 8,759 hours of the year.

Q. DO YOU AGREE WITH SCE&G'S ASSERTION AND SUBSEQUENT ANALYSIS THAT "THE HOURLY LOLE IS MORE FLAWED THAN THE DAILY LOLE" (LYNCH REBUTTAL, PP. 5-8)?

A. No. Witness Lynch fails to acknowledge my testimony reflects that "an hourly LOLE study, or similar hourly study, is needed to perform this calculation [of the capacity value of solar] directly. His rebuttal does not address this point. Rather he challenges the determination of reserve margins, which is not at issue.

Moreover, witness Lynch attempts to undermine the entire field of hourly LOLE studies through the presentation of his hourly and sub-hourly LOLE results (Lynch Rebuttal, pp. 6-7). The electric industry does not share witness Lynch's disdain for hourly LOLE studies. According to the North American Electric Reliability Corporation's ("NERC") *Probabilistic Adequacy and Measures Technical Reference Report (April, 2018)*, 74% of survey respondents that conduct LOLE studies perform hourly (8,760 hours

per year) analyses, whereas only 16% perform daily peak analyses (365 hours per year) (NERC, pp. 14-15).[2]

Q. DO YOU AGREE WITH SCE&G'S ASSERTION THAT "SINCE INCREMENTAL AMOUNTS OF SOLAR DO NOT ENABLE SCE&G TO AVOID CAPACITY COSTS, THE AVOIDED CAPACITY COSTS ARE ZERO" (LYNCH REBUTTAL, P. 8)?

A. No. SCE&G has failed to prove that solar does not enable SCE&G to avoid capacity costs. Solar avoids capacity costs by reducing the need to procure or construct capacity resources. The capacity procurement or construction need is driven by the utility's Integrated Resource Plan ("IRP"), so recognizing the capacity contribution of solar in the IRP is the key to realizing the capacity value of solar. Witness Lynch has shown that using their flawed approach, SCE&G attributes zero winter capacity to solar. This translates to zero winter capacity counted for solar in SCE&G's IRP (Neely Direct, pp. 11-12), which then results in zero capacity value or avoided capacity cost for solar because SCE&G focuses on the winter season for determining the need for capacity.

If SCE&G were to value solar capacity using an appropriate hourly probabilistic method (such as the industry-standard hourly LOLE method discussed above), then capacity contributions from solar generation could be included in their resource plans which would then produce avoided capacity costs. Absent an appropriate hourly study by SCE&G, I recommend the Commission adopt my 4% solar capacity value factor (solar

[2] In May 2017, the NERC Probabilistic Assessment Working Group distributed a survey on probabilistic studies to seek information on probabilistic approaches adopted by NERC Regions and Assessment Areas, Balancing Authorities and other industry entities in North America. They received responses from 70 practitioners and reliability experts.

contributes 4% of its nameplate capacity toward capacity need reductions) and incorporate the associated 4% capacity contributions from incremental solar into their future IRPs.

Q. DO YOU AGREE WITH SCE&G'S CLAIMS THAT YOUR CAPACITY VALUE FACTOR OF 4% AND AVOIDED CAPACITY VALUE OF $0.0029 PER KILOWATT HOUR ("KWH") DERIVED FROM THE DEP AND DEC SYSTEMS ARE IRRELEVENT TO THIS DOCKET (LYNCH REBUTTAL, PP. 9-10)? IF NOT, WHY?

A. No. The use of DEP and DEC data is relevant to this docket because in Docket No. 2018-2-E, the Commission adopted the SCE&G position of zero avoided capacity value primarily because the other parties, of which ORS was one, did not present an alternative value.[3]

It was necessary to provide my own estimate of avoided capacity costs for solar. Absent an appropriate capacity study from SCE&G, however, I believed and continue to believe that the detailed comprehensive studies on the relationship between solar penetration and solar contributions to system capacity for the two neighboring utilities are appropriate to use in this Docket.

SURREBUTTAL TO REBUTTAL TESTIMONY OF MATTHEW W. TANNER

Q. DO YOU AGREE WITH SCE&G'S JUSTIFICATION FOR USING A 1% THRESHOLD FOR ESTIMATING SOLAR UNCERTAINTY IN THEIR MODELING FOR RESERVES INSTEAD OF YOUR RECOMMENDED 2% TO CALCULATE VARIABLE INTEGRATION CHARGES (TANNER REBUTTAL, PP. 2-4)?

[3] Docket No. 2018-2-E; Order No. 2018-322(A) pp.15-16

A. No. Witness Tanner asserts "Navigant determined that assuming a 1% level of solar uncertainty is appropriate and provides the appropriate tradeoff between the cost of holding more reserves and mitigating the risk from undergeneration". However, he fails to offer any support for this determination in his direct testimony, rebuttal testimony, or in the Cost of Variable Integration report ("Navigant Report") included with his direct testimony as Corrected Exhibit No._(MWT-2). There is no prior mention of the 1% threshold (the Navigant Report only refers to using "worst case drops in solar generation" on page 22). There is also no evidence that other threshold levels were evaluated and found to be inferior.

Given the lack of justification for the Navigant 1% threshold and given that my adjustments to the Navigant analysis result in integration costs that are far more consistent with studies in neighboring jurisdictions that are also integrating large amounts of solar, I recommend that the Commission adopt my lower integration cost estimate of $2.18 per megawatt-hour ("MWh").

SURREBUTTAL TO REBUTTAL TESTIMONY OF ERIC H. BELL

Q. DO YOU AGREE WITH SCE&G'S ASSERTION THAT OPERATING THEIR ELECTRICAL SYSTEM AS YOU RECOMMEND WOULD "EXPOSE SCE&G TO BEING NON-COMPLIANT WITH FERC REQUIREMENTS 2% TO 4% OF THE TIME" (BELL REBUTTAL, PP. 7-8)?

A. No. Witness Bell has not demonstrated how this 2% to 4% range was calculated or even specified if that is an expected number of hours of violation, or only a range of hours for which there might be a violation if certain conditions all align. Also, witness Bell has not provided any cost estimates to remediate any expected actual violation conditions or

demonstrated that interchange transactions, demand response, or non-firm (interruptible) load could not be used to prevent violations at a lower cost than the VIC modeled in the Navigant Report.

For example, Table 11 of the Navigant Report shows their variable integration analysis assumed only 100 MW of "Interruptible Load for reserves," while SCE&G's IRP states there is in excess of 200 MW of interruptible load under contract (2019 IRP, p. 14).

Q. IN HIS REBUTTAL TO MR. KIRBY, WITNESS BELL STATES THAT "SCE&G DOES NOT BELIEVE IT WOULD BE APPROPRIATE, PRUDENT, OR REASONABLE TO RELY UPON INTERRUPTIBLE LOAD TO MEET ITS NEED FOR DAILY OPERATING RESERVES USED TO FOLLOW LOAD AND SMOOTH GENERATION" (BELL REBUTTAL, PP. 5-6). DOES THIS RULE OUT THE USE OF INTERRUPTIBLE LOAD AS YOU SUGGEST ABOVE?

A. No. I would agree with Witness Bell if the interruptible loads were being curtailed repeatedly for certain situations, such as load following. However, my suggestion above is that more interruptible loads be incorporated as an option for meeting the infrequent contingency reserve violation hours. Since one would only to need to call on interruptible load under the joint conditions of high demand, a large drop in solar output, the loss of other generation, and the inability to import additional power, I would expect the hours of curtailment to be few if at all. I therefore believe that it would be appropriate, prudent and reasonable to rely on interruptible loads for contingency reserves.

Q. HAVE YOUR RECOMMENDATIONS MADE IN YOUR DIRECT TESTIMONY CHANGED?

A. No, those recommendations remain the same:

1) SCE&G's position that the 15-year levelized avoided capacity cost should be set at $0.00 should be rejected;

2) The DER 15-year levelized avoided capacity cost should reflect a 4% capacity value factor and be set at $0.00290/kWh;

3) The DER line losses should be updated to reflect the avoided capacity cost; and

4) The VIC should be set at $2.18/MWh.

Q. DO YOU HAVE ANY ADDITIONAL RECOMMENDATIONS?

A. Yes. I add the recommendation that SCE&G use a 4% solar capacity value factor for solar in its IRPs.

Q. DOES THIS CONCLUDE YOUR SURREBUTTAL TESTIMONY?

A. Yes, it does.